Social Science Contributions to Warn-on-Forecast

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From www.jamesspann.com

Who we are

Dr. Eve Gruntfest

- Geography professor at the University of Colorado (1980-2007)
- Career as a "socio/hydro/meteo – logist"
- Improving flash flood warnings built on lessons from the deadly 1976 Big Thompson flood in Colorado
  - Social scientist working with meteorologists and hydrologists

Dr. Heather Lazrus

- Ph.D. in Anthropology (study of people and culture)
- Focus on climate and weather perceptions, impacts, and community responses
- Dissertation - 10 months in TUVALU, a small island nation in Pacific region experiencing deep social and climate changes
- Experience with social science at NOAA Fisheries in Alaska and Pacific Northwest

Masters degree students in Geography and Environmental Sustainability

Expecting to graduate May 2012

Stephanie Hoekstra

- B.S. in Atmospheric, Oceanic, and Environmental Sciences at UCLA
- Work funded by Warn-On-Forecast
- Thesis: **Weather Information Use and Decision-Making of K-12 Schools during Tornado Warnings**

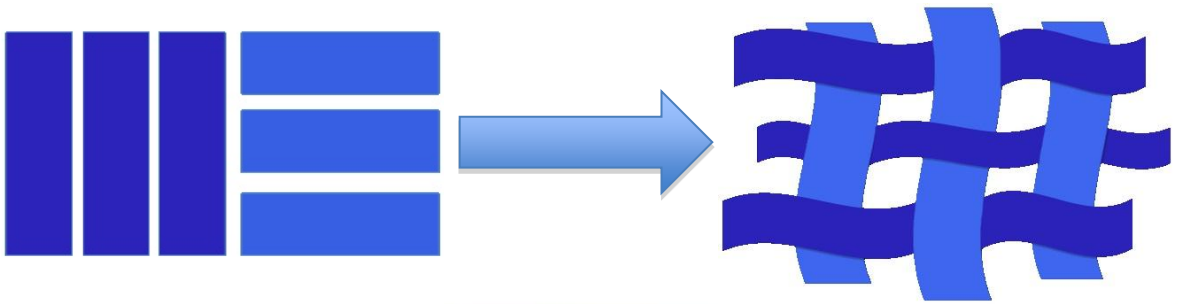
Amy Nichols

- B.A. in Anthropology at University of Florida
- B.S. in Meteorology at Florida State University
- In collaboration with SSWIM and HWT
- Thesis: **Sources and Uses of Hazardous Weather Information in Decision-Making by Institutions of Higher Education**

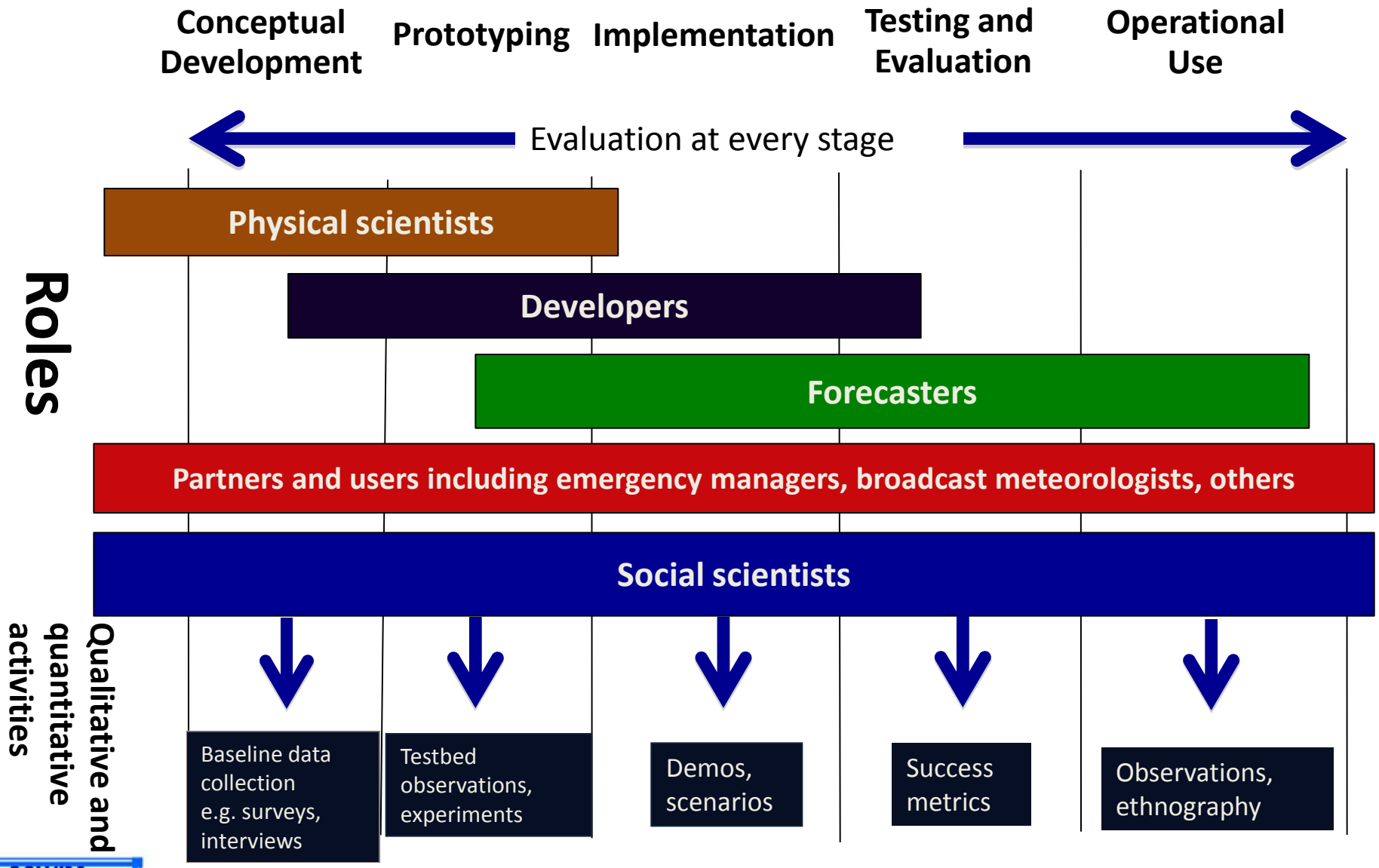
Social science and Warn-on-Forecast –

Now and in the future

- **Sustainably weaving in social science - Not as add on**
- **Social science now formally included in National Weather Service and NOAA Strategic plans**
- **Use social science methods and theories to inform the warn-on-forecast effort**

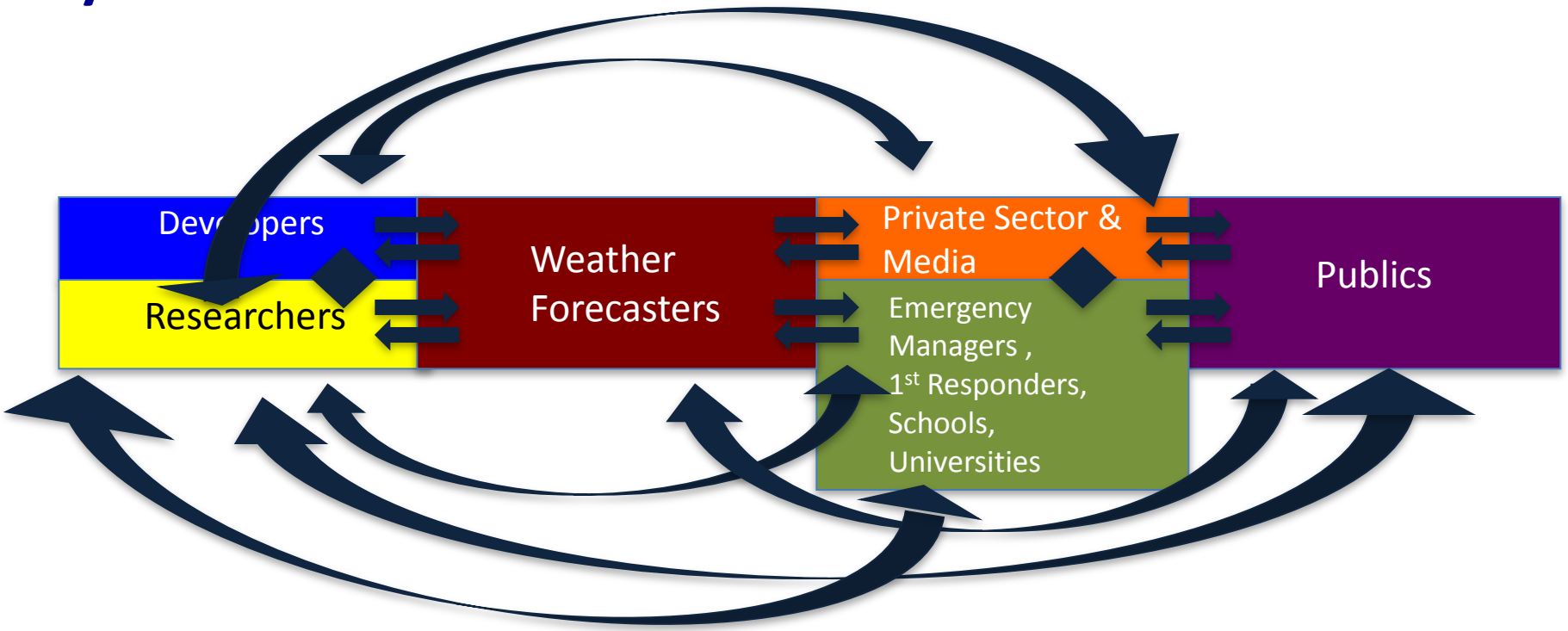


Research-to-Operations



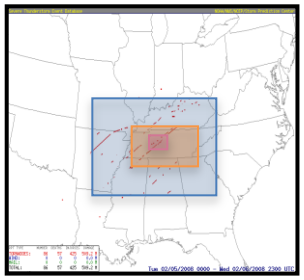
Adapted from Global Systems Division 2009

Weather forecasters and software developers need to know about how people use their products to make decisions – SSWIM is working with NOAA Global Systems Division and Hazardous Weather Testbed

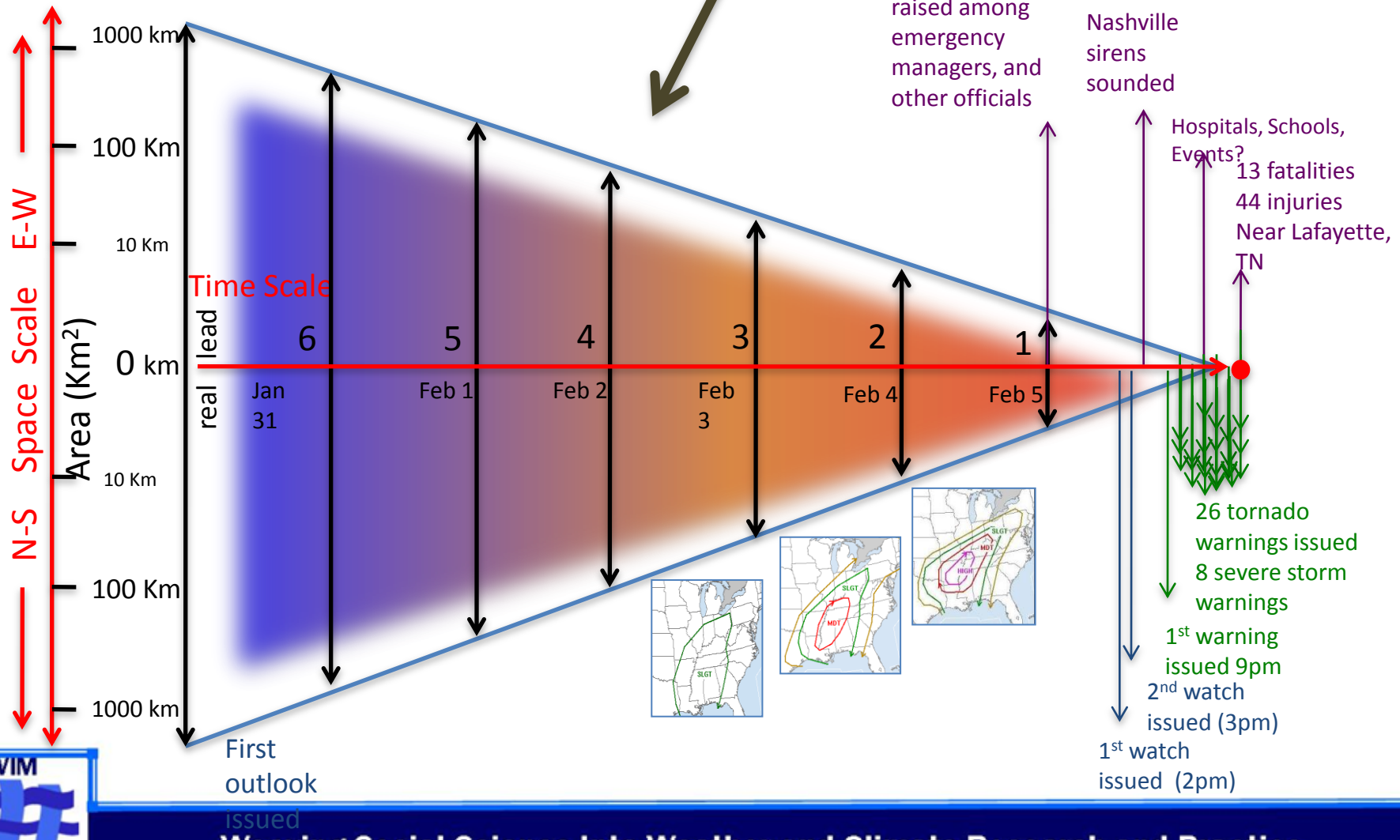


Social scientists find out what the weather sensitive decision-makers use and need

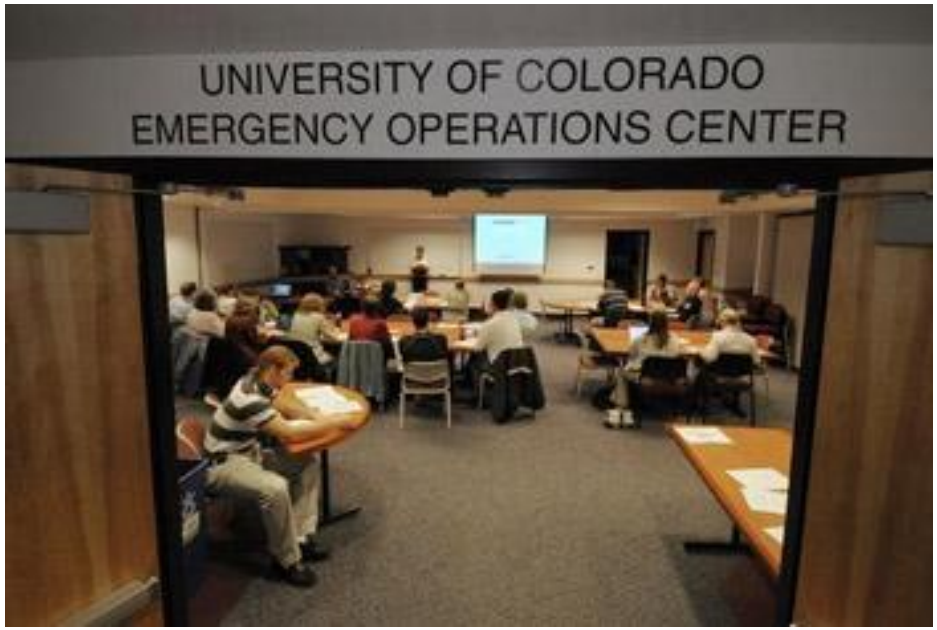
Geographic space scales: Regional, State, Local



Social science research is helping to fill in this time line from outlooks, to watches, to warnings



Our research: How do officials in school districts and institutions of higher learning use weather information to make decisions?



Research goals

- Hazardous Weather Testbed (Nichols)
  - Assess the usefulness of weather products to IHEs
  - Determine the impact of probabilistic hazard information and longer lead-time to IHE decision-making

- Warn-On-Forecast (Hoekstra)
  - Gain insight as to which sources of information are most useful to schools
  - Determine the potential impacts (pros and cons) of longer lead-times for decision-making

Large U.S. vulnerability in schools

School Districts

- **On any given weekday 20-25% of the United States population is in a school (Hull 2010; *Digest of Education Statistics* 2009)**
  - **More than 50,000,000 people in US**
- **Young age → Lack of legal autonomy**
  - **Schools are obliged to provide safety to all students**
- **Other factors that affect decision-making**
  - **District size**
  - **Architectural design and structural integrity**
  - **Bus routes**
  - **Legal obligations**

Complex organizations with large emergency management challenges

Institutions of Higher Education (IHEs)

- **~4352 IHEs in US (*Digest of Education Statistics 2009*)**
  - **More than 21,000,000 students, faculty, and staff**
- **Legally obligated to provide emergency notification to population at time of threat**
- **Large endowments and expensive operations**
- **Additional concerns within emergency management (DOE 2010)**
  - **Complex geography**
  - **Legally autonomous populations**
  - **Research, services, instruction**

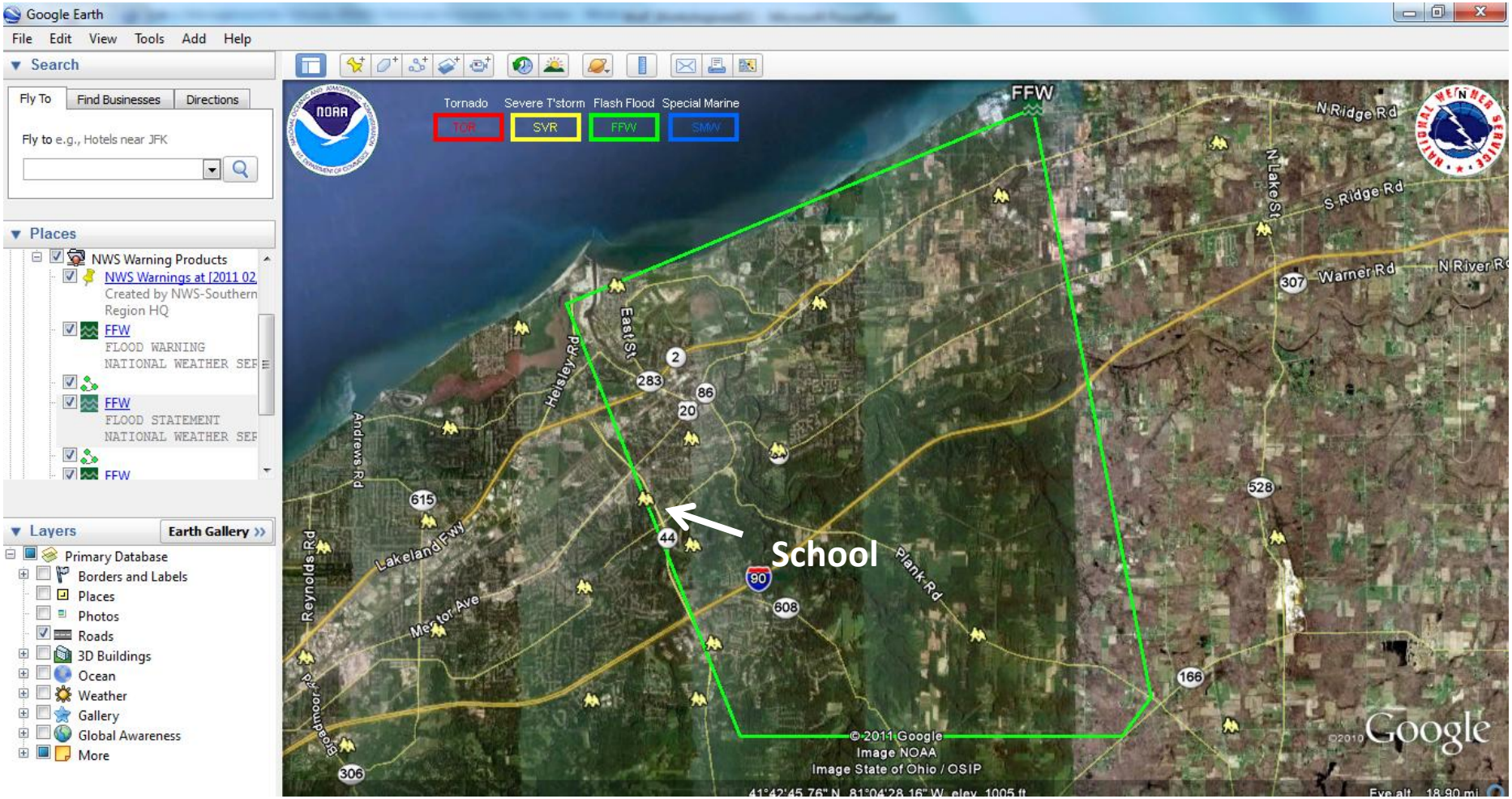
Three main research questions

1) What sources of information do Schools and Institutions of Higher Education (IHEs) use during severe weather events?
2) How and when do they use these sources in decision-making?
   - -K-12 Schools- protection and sheltering of students and faculty
   - -IHEs- emergency notification systems and class cancellation
3) What decision support tools would improve operations?
   - -Hoekstra - Lead time
   - -Nichols - Lead time and probabilistic warning information

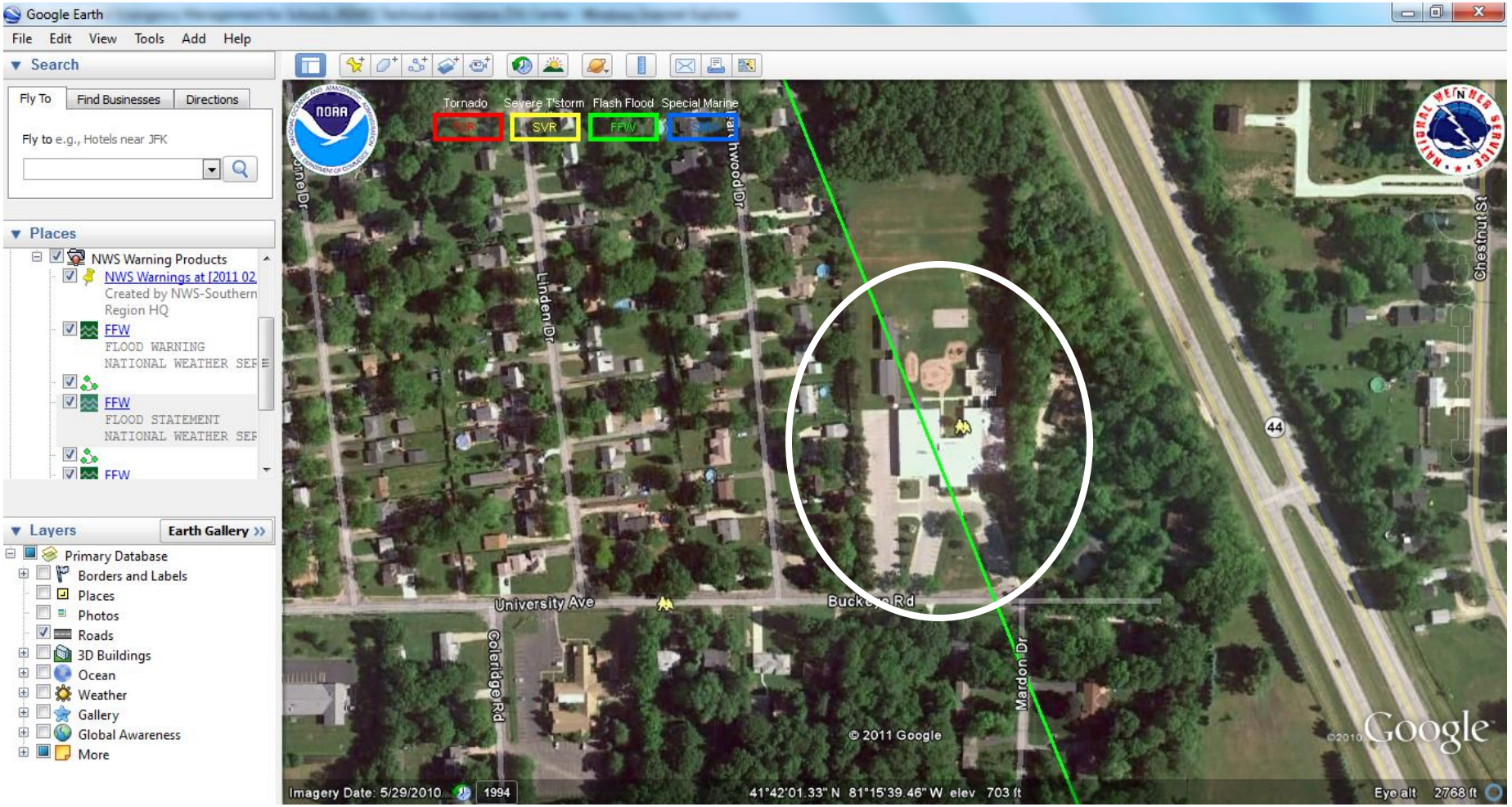
Project methodology

- In depth case studies of Schools and IHEs under tornado warnings during Spring 2011
  - Interviewing post-event
    - Gives insight into actual behavior versus idealized behavior
    - Ensures most complete recollection of memories
  - Case studies provide more in depth information than sampling multiple sites
    - Nichols- 2 Case Studies of IHEs
    - Hoekstra- 3 Case Studies of K-12 Schools
    - Allows us to understand the chain of events throughout the system
- Sampling methods
  - SPC Day 1, 2, 3, and 4-8 Convective Outlooks and SPC Tornado/Severe Thunderstorm Warning Alerts
  - Using Google Earth, we will overlay Real-Time NWS Warning KMZ Files with Place data
    - Pinpoint schools or IHEs affected by warnings
    - Contact schools and IHEs post-event

Using Google Earth warning polygon



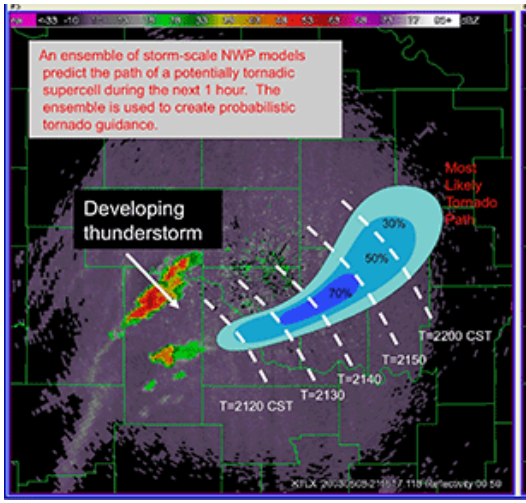
What decisions would you make if you were the decision-maker at this school?

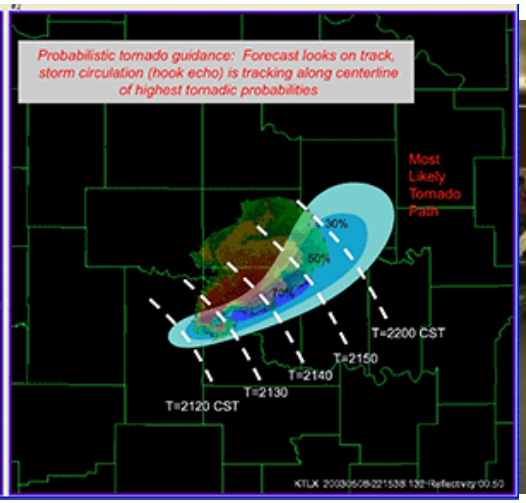


Project methodology – qualitative interviews

- **Designing interview questions and conducting phone and in-person interviews with decision-makers**
  - **Hoekstra - district officials, superintendant, administrative staff, teachers in Central Oklahoma**
  - **Nichols - IHE emergency managers, administration, utilities services, housing services, transportation**
- **Interview topics**
  - **Demographic information**
  - **Sources of information**
  - **Warning response and decision-making in space and time**
  - ***What types of information do they need?***

Warn-on-Forecast will succeed when the physical science and social science advance





Decision-makers must have the information they need in formats that make sense to them

Social science will help us all understand decision making contexts – where weather is part of a complex set of considerations

Thank you to

- **Dave Stensrud** for recognizing the need to integrate social science in WOF
- **Steve Koch** for funding new creative initiatives
- **Harold Brooks** for coordinating social science activities – ***This afternoon he will offer the overview of other social science projects and possibilities***

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www.SSWIM.org

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